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OBSERVATIONS CONCERNING THE ENDO-  
THELIAL LINING OF THE ANTERIOR  
CHAMBER IN HEALTH AND DISEASE.

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[ WITH MICRO-PHOTOGRAPHS. ]

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BY ADOLF ALT, M.D.,

OF ST. LOUIS, MO.

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In the following articles I desire to acquaint our readers with the results of a prolonged series of investigations concerning the endothelium of the anterior chamber, viz., of Descemet's membrane, the ligamentum pectinatum, and the iris. It seems to me that this is a field which has thus far been treated rather slightly, as important as it is, for the full understanding of many pathological conditions seen clinically.

I shall illustrate the conditions described by micro-photographic reproductions from my specimens, although they do not come up to the ideal. He, who has worked in this field, will not be too harsh a critic, as he must well know the difficulties and disappointments which cling to this work. Yet, I think, that even a moderate micro-photographic reproduction is superior to a drawing by hand, in so far, that, when like mine, it is in no way retouched, it shows the actual conditions. Those familiar with the subject treated on, will understand

what is tried to be represented, even if the picture is not perfect from the standpoint of an artist.

#### I. THE ENDOTHELIAL LINING OF DESCMET'S MEMBRANE.

The endothelium lying on the inner surface of Descemet's membrane has thus far been but imperfectly studied. The references to it found in literature, aside from text-books, are usually made in the descriptions of pathological conditions found during the examination of a diseased eye (Fuchs, Leber,

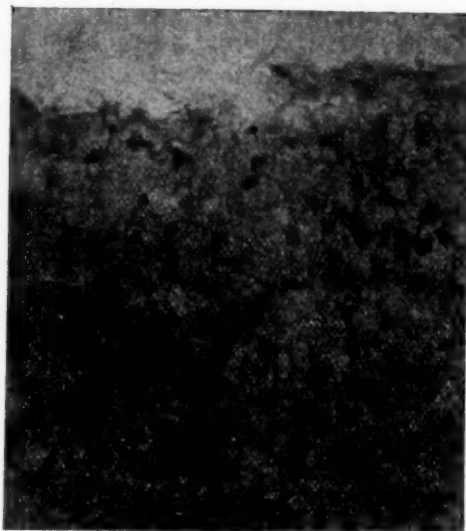


FIG. 1.—Shows the endothelium of Descemet's membrane in a high state of activity (unrest). Not only is the cell-protoplasm contracted in the most grotesque shapes, but the form of the nuclei also is very different from the one in cells when at rest.

Knies and others) and are, therefore, few and far between. I have made a series of systematic investigations concerning this tissue in a great many hardened human eyes, by removing a part of Descemet's membrane from the corneal tissue by a section, including as little corneal tissue as possible. I have found this to be a better method than to tear Descemet's membrane off, as is usually done. The transverse sections of this membrane are not calculated to teach us much.

The usual description of the endothelium of Descemet's membrane, as given in the text-books, is, that it consists of a single layer of flat, polygonal (mostly hexagonal) cells, with a round or oval nucleus. These cells are described as lying closely adjoining each other with a cementing substance between them, which can be stained with nitrate of silver.

To a very similar description Waldeyer (Graefe and Saemisch, Vol. 1, p. 203) adds the following, which he illustrates by a drawing.

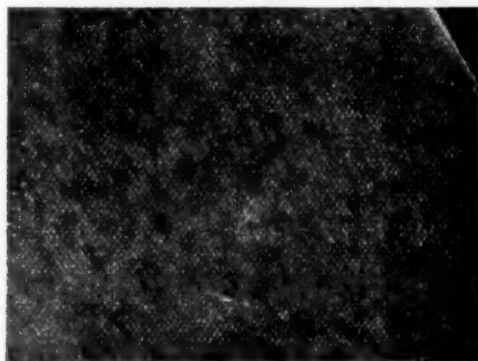


FIG. 2.—Shows a state of activity of the endothelial cells of Descemet's membrane less advanced than in Fig. 1. There is still a certain regularity preserved.

"Seen in profile, the middle portion of these cells appears thicker and somewhat protruded, on account of the nucleus. In fresh specimens the outlines of the individual cells can hardly be seen; however, after a short immersion in serum or salt solution the cells fall easily asunder. A very short impregnation with a weak solution ( $\frac{1}{8}$  or  $\frac{1}{10}\%$ ) of nitrate of silver produces sharp-cut lines of demarcation between the individual cells. Here and there small, light openings are seen between the cells, looking like stomata. In specimens stained with hæmatoxyline I have often seen a peculiar change in the outlines of the cells, as if they had receded from each other and were connected by fine threads only, so that a number of apertures showed between them. I can not say, whether this condition exists during life, as I never saw such pictures in perfectly fresh specimens."

This latter statement of Waldeyer's, important as it is, so far, seems to have aroused no desire for further investigation.

In a general way my observations agree with those of former authors. The endothelial lining of Descemet's membrane undoubtedly consists of a single layer of flat polygonal cells, with a round or oval nucleus. The more or less regularly hexagonal form of these cells, as often mentioned, and drawn from animals' eyes, particularly, is, however, but rarely found.



FIG. 4. — Descemet's membrane from an injured eye, removed two days after injury. Anterior chamber filled with fibrine containing pus and blood. Where pus cells and blood-corpuscles lie on the endothelial cells, these are seen to withdraw, so to speak, and make room for the intruders. Otherwise, the endothelial cells are still in a state of rest, although their nuclei show karyokinetic figures.

To this general description I have to add, that the shape and arrangement of the cells varies considerably with the age of the individual. In the eye of the newly born the nucleus is large and the cell-protoplasma very insignificant in quantity, so that the nuclei are very close to each other. With increasing age, the nuclei do not seem to grow smaller, yet the cell-protoplasma increases materially in quantity and an irregular arrangement of the nuclei results. Some lie close to each

other, others a very considerable distance from each other. With a certain regularity I find, that in the adult eye the cells are considerably larger and the nuclei farther apart near the center of the cornea. Near the periphery and just in front of where the ligamentum pectinatum begins, they are usually much smaller and consequently more numerous and their nuclei lie much closer to each other, although not as close as in the eye of the newly born.

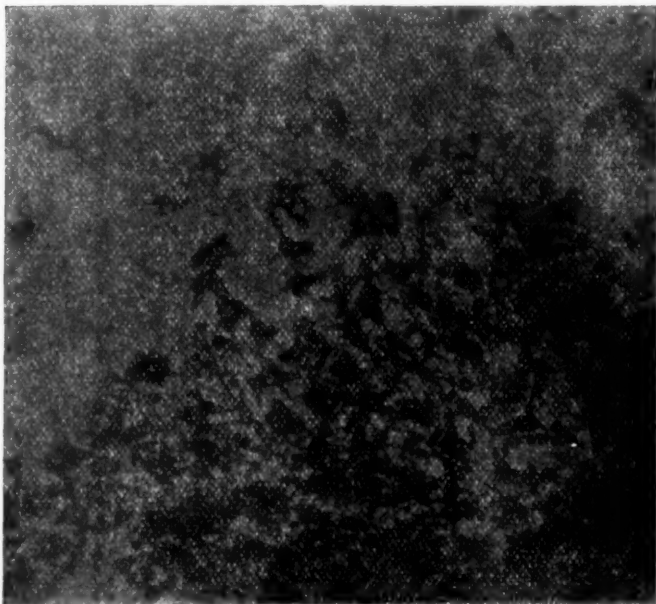


FIG. 5.—Obliteration of iris-angle (glaucoma). Descemet's membrane is unstained; its endothelium is, therefore, not visible. Pigment-cells are seen to creep forward between the endothelial cells from where the iris is attached to Descemet's membrane (lower right-hand corner). Patient, 36 years old.

The conditions here described, I consider as those in which the endothelial cells may be considered as being at rest. This is the condition which has usually been seen and described by the authors and which, strange to say, is just the one, I have found most rarely to exist in the human eyes, as I had occasion to study them. Indeed, quite frequently when I



thought I had a nice specimen of the endothelial cells at rest, I found with a better light and a higher magnifying power, that I had been mistaken. While Waldeyer, then, described the changes, above mentioned, as the exceptions from his observations, I, on the contrary, come to the conclusion, that the restless, or active, condition of the endothelial cells, if I may call it so, seems to be rather the norm, and the usually described condition of rest seems to be the exception.

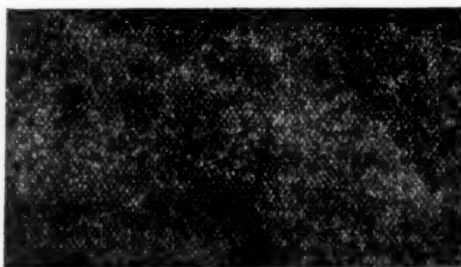


FIG. 6.—Slanting section through the endothelial layer of Descemet's membrane near the periphery (patient 50 years of age). Hyaline warts have replaced the endothelial cells altogether.

The simplest variation from the condition of rest is one in which each cell is surrounded or outlined by a shining line, separating it from the neighboring ones. This corresponds to the black (cement ?) line produced by impregnation with nitrate of silver, and appears like the clear lines dividing the individual cells of the pigment epithelium layer of the retina. I think, it is the initial stage of the changes about to be described.

What Waldeyer saw exceptionally in specimens stained with hæmatoxyline, is the appearance of the endothelial cells under consideration, most frequently seen. I mean, the retraction of the cells from each other, leaving open spaces between them. The variety of shapes which the cells adopt during this condition of unrest, by the contraction of the cell-protoplasma around the nucleus, away from the neighboring cells, leaving only small threadlike connecting fibres, is simply undescribable (see Fig. 1). In some cases a certain degree of regularity seems to obtain in the manner of this contraction of the cell-

protoplasma (see Fig. 2). In others, as just stated (and this is the most frequently seen in all sorts of eyes) the cells and their nucleir take on the most grotesque shapes. The apertures between the cells which result from the contraction of the cell-protoplasma are mostly round, sometimes oval, but they vary in size to a very considerable extent.

That this condition is one of cell-activity is shown by the fact, that all the nuclei show karyokinetic figures, and very frequently nucleolar and cell-division can be found.



FIG. 7.—Oblique section through Descemet's membrane near its periphery. (Patient 47 years of age). Shows the beginning and formation of vitreous warts from metamorphosed endothelial cells. The neighboring cells are all in a state of unrest.

I again wish to state here, that I found these conditions often in apparently normal eyes, but particularly in pathological ones, in which, however, during life the anterior part of the eyeball had appeared perfectly normal, and they were the rule, almost without exception, in eyes with pathological conditions affecting the anterior part of the eye.

When there is a foreign substance, as, for instance, an exudation in the anterior chamber, its very presence often stimulates the endothelial cells to rapid division, so that soon clusters of round, vesicular cells are seen to form on the original layer and protrude into the anterior chamber. Often these

round cells seem to coalesce and to form giant cells with many nuclei. (See Fig. 3).\*

In other cases, when, as in injured eyes, pus and blood fill the anterior chamber and lie against the endothelium, its cells withdraw, so to speak, before the enemy, and make room for him, as seen in Fig. 4. This is, perhaps, even better illustrated, although this specimen is not stained and does, therefore, not show the condition of the endothelium of Descemet's membrane, by Fig. 5. Here pigment cells from the iris have crept on between the endothelial cells of Descemet's membrane to a considerable distance. This condition is very frequently seen, when the iris angle is obliterated and the periphery of the iris is agglutinated to the inner surface of the cornea, although I have not often seen these pigmented cells having wandered quite as far forward as in this specimen.

As is well known, vitreous warts (Hassal) are very frequently found to lie between the endothelial cells in the periphery of Descemet's membrane (see Fig. 6). These warts are, by many considered to be characteristic of adult or old age. This is, however, not absolutely the case, as I have seen them in several eyes of young children. In trying to learn the mode of their origin I have gradually become convinced that these vitreous warts are the result of a degenerative metamorphosis of the endothelial cells themselves and that each wart corresponds to such a changed cell. The process seems to be, that at first the cell loses its vitality. Instead of being able to contract its cell protoplasm like the neighboring cells, it appears rounded off and gradually its nucleus takes up less stain, and finally such a cell may at one time appear as a roundish, barely stained, amorphous mass lying between the surrounding cells. Gradually this amorphous mass becomes more and more homogeneous and forms the so-called vitreous wart (see Fig. 7). In so far the process corresponds exactly to the one seen in the pigment epithelium, where the warts are usually described as colloid excrescences.

From all this it appears, that we have in the endothelium of Descemet's membrane not, as the prevailing idea seems to be, a tissue which undergoes but little change during life, but

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\*FIG. 3.—This illustration not having been anyways successfully reproduced, will be given in our next issue.



on the contrary, a membrane in the cellular elements of which activity is rather the rule. This fact being, I think, established, it will well repay to go still further into the study of the life habits of the cells of this membrane. May be, that certain clinical pictures will find a better explanation and one founded on more palpable facts, than was hitherto the case.

[TO BE CONTINUED.]

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### OPHTHALMIC MEMORANDA.<sup>1</sup>

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BY G. E. de SCHWEINITZ, M.D.,  
OF PHILADELPHIA.

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#### RECONSTRUCTION OF THE UPPER LID BORDER BY HOTZ'S METHOD.

In a recent number of the *Annals of Ophthalmology and Otology*, Dr. F. C. Hotz, of Chicago described an operation suited to the cure of entropion of the upper lid with trichiasis, as follows:

"The lid border is split by the well-known intermarginal incision, which is made so deep that the anterior edge of the lid can be turned up with perfect ease. Next a transverse incision is made through the lid skin and the orbicularis muscle, just below and parallel with the upper line of the tarsal cartilage, and the strip of the muscular fibers which covers the upper border of the cartilage is excised, and the lid skin subsequently united with the upper border of the cartilage by means of three sutures. One suture is placed at the center of the wound and one at either side of the central one. Each suture passes through the edge of the lid skin, then through the upper border of the cartilage, and finally through the upper edge of the skin wound. When these sutures are tied the lid skin is drawn upward and fastened to the upper border of the tarsus. This traction upon the lid skin is sufficient to cause a thorough eversion of the anterior edge of the

<sup>1</sup>Read before the Ophthalmic Section of the College of Physicians of Philadelphia, January 21, 1896.

split lid border, and when the anterior edge is thus turned up and separated from the posterior edge, the intermarginal incision becomes a gaping wound several millimeters in depth and with sloping sides. This groove is filled with a skin graft, preferably taken from behind the ear, as follows: A longitudinal incision, about one millimeter deep, is made as long as the graft is to be, then a second incision is made parallel to the first at a distance of two millimeters. The second incision is made to join the first one at both ends, and the narrow wedge-shaped piece of skin thus mapped out is dissected completely off and transferred to the wound in the lid border. The graft is spread out and gently pressed into the groove and the area thoroughly irrigated with a normal salt solution."

I have performed this operation in several instances and have been well satisfied with it. I present for your consideration this evening three cases:

CASE I.—The patient, a middle-aged woman, has been in the wards of the Philadelphia Hospital on several occasions. Some years ago I removed her right eye. It was a shrunken eyeball—a typical example of the so-called phthisis bulbi, which had become inflamed and painful. At that time she had a chronic trachoma of the left eye, and some opacities in the cornea, although the process was not a particularly active one.

She disappeared from observation, and reappeared within the last two months, presenting marked entropion of the upper lid of the left eye, the lesions of an old granular conjunctivitis on the tarsal conjunctiva and irregular opacities of the cornea the result of pannus, which was active when the trachoma process was at its height.

In addition to the inversion of the lid border, all of the cilia were misplaced and constantly rubbed and irritated the corneal surface, which was vascular, inflamed, and the cause of a marked photophobia. Vision amounted to light perception.

Dr. Hotz's operation was performed, according to the directions already quoted, the only difference being that preceding the transplantation of the graft I made an external canthoplasty. The dressing consisted of a piece of sterilized protective, over which was placed a pad of gauze soaked in

sterilized saline solution and held in place by a few turns of a gauze roller. When the bandages were removed at the end of forty-eight hours, the graft was found adherent throughout the entire length of the incision, the eyelashes were lifted well away from the cornea, and the photophobia was markedly diminished. The graft was not entirely perfect at the inner end, or, rather, I had not prolonged the intermarginal incision sufficiently far towards the inner angle. Therefore, a fortnight later, I implanted a small graft to cover this deficiency. As you may now see, the patient has a rounded lid border, the lashes, are lifted from the cornea and the photophobia has entirely disappeared. The vision is exceedingly defective on account of corneal opacities, but it amounts to about  $\frac{6}{60}$  and the patient is able to get around without assistance—a marked gain over her previous condition of practical blindness.

CASE II.—A woman, aged about 65, long a resident of the Philadelphia Hospital, having been treated for a variety of complaints, namely, symmetrical necrosis of the malar bones, ectropion of the left eye, granular lids, most marked upon the right side, inversion of the lid border and trichiasis. For the last named condition certainly two, and I think three operations have been done. About three years ago I performed the ordinary Jæschke-Arlt operation; for a time the patient was better, but a relapse occurred. One of my colleagues performed one and I think two operations on her eyelids, the exact nature of which I am not sure. In November, 1895, the trichiasis, inversion, vascular cornea, constant irritation, etc., were as marked features as they ever had been, and therefore I advised the operation just described. It was done exactly according to the directions of Dr. Hotz, and has resulted, as you may observe, in a perfectly rounded lid border, and a normal position of the lashes.

CASE III.—A man, aged 48, was admitted to the Ophthalmic Wards of the Philadelphia Hospital in January of the present year, with the following history: Twenty years ago, while intoxicated, his right eye became inflamed after exposure to cold, and since that time has never been entirely free from irritation. He has had all manner of treatment and one operation, probably a canthoplasty. About the time of the

operation the cilia began to be misplaced and to rub against the cornea, and for twelve years he has been in the habit of pulling them out with a pair of forceps.

When examined the scars of an old granular conjunctivitis were evident, the cornea was vascular and very hazy, the ciliary border irregular, and most of the lashes misplaced and rubbing against the cornea.

The operation of Dr. Hotz was performed. When the dressing was removed on the second day, it was found that the graft had become adherent to the dressing at one corner and had assumed an unhealthy color. It was, therefore, removed from its position, and another somewhat larger graft cut from behind the ear and pressed into place. The usual dressing was reapplied. The transplanted skin became rapidly adherent, and the case, although not yet of sufficiently long duration to state positively, promises as fair a result as the others.

It is possible that the primary graft might have grown, but it did not seem worth while to run the risk of subsequent disintegration when a fresh graft appeared to offer better chances of success. I have employed this method in several instances of skin grafting and always successfully. Sometimes I have adopted Dr. Gifford's suggestion to remove the disintegrating epithelium and cover the surface with a Thiersch graft, and sometimes I have removed the flap itself and put a fresh one upon the delicately granulating surface which is then visible. Ordinarily in Dr. Hotz's operation, however, there is not much danger that the result will be otherwise than good. In the present instance the patient was in very bad condition, and the graft itself was somewhat narrower than the others which had been used, and therefore, its nutrition less perfect. Moreover, it was allowed to remain in the salt solution a much longer time than was judicious. In my experience this operation, if I may judge from a very few cases, promises most fairly, and has given me better results, and more rapidly, than any of the other operations which are commonly performed for the relief of this condition. I am inclined to cut the graft somewhat wider than the one described by Dr. Hotz, the width in each of the instances quoted being not less than three millimeters.

## TWO CASES OF MACULAR HÆMORRHAGE.

CASE I.—*Iritis; Secondary Glaucoma; Iridectomy; Circumscribed Hæmorrhage Exactly Occupying the Center of the Dark Area of the Macula.*—During the first week in August, 1895, a woman, aged 50, a patient of Dr. Thomas Leidy Rhoads, after a severe attack of ovarian pain, developed iritis first in the right and later in the left eye. The attending physician used atropine for four days, when he noted elevation of tension and substituted eserine for the atropine, and asked me to see the case in consultation.

Vision at that time was counting fingers at three feet in the right eye and at two feet in the left eye. Both corneæ were steamy, the pupils semi-dilated and fixed, and synechiæ were visible in the right eye. A patch of lymph covered the capsule of the lens and prevented a view of the fundus. The treatment consisted, according to the condition of tension, of eserine, or atropine, leeches, hot compresses, mercury and iodide of potassium, the last two drugs being pushed to the extreme, as there was a clear syphilitic history.

Two months later the vision of the right eye was  $\frac{6}{LX}$  and of the left  $\frac{6}{XXII}$ . The remains of iritis were evident upon both sides, but now each fundus could be seen. On the right side the eye ground was normal and there was no cup in the disc; on the left side there was a partially formed pathological cup. Tension of the right eye  $+ \frac{1}{2}$  of the left  $+ 2$ . Three weeks from this date the remains of the iritis of the right eye had entirely disappeared, and after the correction of the refractive error, namely  $+3.25$  S.  $\ominus +.50$  C. axis V, the vision rose to  $\frac{6}{V}$ . The vision of the left eye, in which the iris was still infiltrated, and the tension remained  $+ 1$ , with the best correction did not exceed  $\frac{6}{XXII}$ , and the field showed concentric contraction. Iridectomy was urged and performed on October 30th, without accident, although there was free hæmorrhage from the iris. Healing was perfectly normal; pain, irritation, and all inflammatory manifestations subsided.

One month later the patient reported with the vision of the right eye normal, but in the left eye complaining of a scotoma in the center of the visual field. On examination with the ophthalmoscope the appearance, in the accompanying water color by Miss Margaretta Washington, were evident,



namely, a small streaked hæmorrhage at the edge of the disc, and the dark area of the macula exactly replaced by a venous-colored hæmorrhage, with sharply cut borders. The reflex which surrounded the macular region was unusually distinct. Had this hæmorrhage been in the center of the fog-like œdema which is seen in embolism of the central artery of the retina, it would have appeared like an exaggerated cherry-colored spot.

At the end of a month the scotoma had disappeared; the vision was again  $\frac{6}{XXII}$ , and no remains of the hæmorrhage could be found, except a few faint dots and slight discoloration in the region formerly occupied by this extravasation.

As we know, hæmorrhage in glaucoma is not uncommon, and may appear in the form of single or double retinal extravasations, hæmorrhages into the cup of the optic disc, hæmorrhages into the iris, anterior chamber and into the ciliary body. I have never before seen a retinal hæmorrhage in glaucoma of just this shape and so curiously circumscribed, and for this reason report the case.

CASE II.—*Chronic Heart Disease; Oval Macular Hæmorrhage Exactly Replacing the Dark Spot of the Macula.*—

A woman aged 66 years consulted Dr. Robert Saunders in April, 1895, with the hope of obtaining glasses for improving her defective vision, which in the right eye amounted to  $\frac{1}{2}$ , and in the left eye about  $\frac{1}{10}$  of normal. The right eye, after the correction of a hypermetropic astigmatism, regained normal vision and was in itself without notable ophthalmoscopic changes. In the left eye Dr. Saunders discovered the appearances shown in the water color by Miss Washington, which I exhibit, namely, a nearly round disc, with some pigment disturbance at the outer side, a slight physiological cup, no notable changes in the vessels, but in the centre of the macular region an oval area of reddish color containing a few white dots, and occupying almost exactly the middle of the macula. The halo which surrounded the macular region, that is to say, the macular reflex, was unusually distinct. Vision was unimproved by glasses. The peripheral field of vision was normal; there was a central scotoma five degrees on each side of the fixing point and three degrees above and below it. The patient had chronic heart disease and was subject to rheumatism. Otherwise she

was normal. It is my impression that Dr. Saunders told me that a subsequent examination of her urine proved this to be negative, although I have not made this note on my book.

I have not heard the subsequent history of this case, but report it in connection with the other as an example of similarly shaped, circumscribed macular hæmorrhage, due in this instance, I presume, to rupture of the finer capillaries which are not ordinarily seen. It is interesting to note that in both instances the macular reflex was unusually distinct. Indeed, in the second case it constituted an unusually brilliant white ring.

LACERATION OF THE LEFT EYEBALL; SUSPECTED RETAINED  
FOREIGN BODY; ELECTRO-MAGNET OPERATION;  
SUBSEQUENT HISTORY OF THE CASE.

James Dunn, aged 28, was admitted to the Methodist Hospital on April 16, 1895, about one hour after he had received an injury, which consisted of a laceration of the left eyeball by a piece of steel which had broken from a chisel which he was using. His fellow workman reported that a "good deal of white stuff" had run out of the eye.

When examined three hours after the accident the following lesions were found: There was a cut 2 cm. in length along the line of the left external rectus muscle, along the edge of which could be seen the dark border of the choroid. The pupil was widely dilated: there was a dim view of the fundus and a grayish streak passing upward and inward across the vitreous. Down and below a small dark mass was discernable somewhat resembling a blood clot. With + 3 D. the patient was able to count fingers and the visual field appeared to be intact. The eyeball was soft, and the resident physician, who had very properly carefully sterilized the conjunctival cul-de-sac and applied an antiseptic dressing, stated that while he was doing this much vitreous had escaped.

The patient was etherized and the point of an electro-magnet, connected with a two-cell cautery battery, was introduced three times within the eye, moved in all directions, and withdrawn with negative result. The patient had forbidden the removal of the eye. The wound was thoroughly sterilized, carefully drawn together, and a double figure 8 bandage covering a full antiseptic dressing was applied. At the end of two

days there was not the slightest reaction; the wound had closed, the eyeball assumed its normal shape, and almost its normal tension.

Six days later the vision was  $\frac{6}{LX}$ , and with the ophthalmoscope the disc was seen to be round and of good color, numerous fine dot-like and web-like opacities were seen in the vitreous, and far out in the temporal field a wedge-shaped shining patch representing the wound of entrance.

Not the slightest trace of foreign body could be seen. A few days later the patient brought to my office a piece of steel  $1\frac{1}{2}$  cm. in length and about 1 cm. in breadth, which, it was alleged, his fellow-workmen had found in "the white stuff" which leaked out of his eye while he held against it a piece of waste immediately after the accident. The vision was now  $\frac{6}{XXII}$ , and the patient complained of double vision, a study of the images showing that there was paresis of the left inferior rectus. In two weeks the vision of the left eye had risen to  $\frac{6}{IX}$ ; the vitreous was almost entirely clear and nothing could be seen with the ophthalmoscope except the triangular patch previously described. The tension of the eyeball was normal and all its functions perfect. The patient then disappeared from observation and was not seen for about a month, when he reappeared complaining of faulty vision in the left eye, which proved to be scant  $\frac{6}{XV}$ . The entire vitreous was filled with fine, web-like opacities, obscuring the eyeground, which appeared as if seen through a heavy fog.

Two points of interest center about this case: (1) The rapid recovery of an apparently hopelessly injured eye, so that in less than three weeks its functions were practically normal. (2) The insidious approach of a hyalitis, or, rather, the development of a hyalitis from the remains of the former traumatism to the choroid and vitreous. It is a good example of the primary recovery after large loss of vitreous, with the secondary changes that probably occur sooner or later in most of these cases.

HISTORY OF A CASE, IN WHICH FIVE YEARS  
PREVIOUSLY A PIECE OF STEEL WAS  
SUCCESSFULLY REMOVED FROM THE  
VITREOUS CHAMBER BY MEANS  
OF AN ELECTRO-MAGNET.<sup>1</sup>

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BY CHARLES A. OLIVER, A.M., M.D.,

OF PHILADELPHIA, PA.

One of the Attending Surgeons to the Wills' Eye Hospital. One of the Ophthalmic Surgeons to the Presbyterian and Philadelphia Hospitals.

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At about 5:30 P. M. on March 12, 1891, A. W., aged 35 years, a machinist, was sent from the Presbyterian Hospital to the writer, with the history, that twenty-six hours previously, whilst striking the edge of a steel bit with an old hammer, one of several minute pieces of the former (as afterward proved by the freshly fractured surface on the instrument) flew into his right eye. The foreign body caused but little or no pain, but immediately produced a "blood red" appearance before the eye which rapidly passed into "blindness."

Examination with oblique illumination showed that there was a small wound with a shred of epithelium attached to it, extending through the corneal membrane in its outer meridian just beyond the summit. A tear in the corresponding position in the iris-tissue was plainly apparent. The lens was wounded and was already swollen and translucent in places in its outer part. A slight, though dense and firm hypemia, could be recognized in the extreme periphery of the inferior angle of the anterior chamber. Intra-ocular tension was normal.

The ophthalmoscope revealed the presence of sheets of blood in the vitreous humor, these being most marked in the region of the injury. The eyeball itself was excessively irritable, both lacrymation and photophobia being present. Vision was reduced to the ability to see to count the examiner's outstretched fingers when they were held at two-thirds of a metre's distance straight in front of the eye. With the exception of a

<sup>1</sup>Paper read and patient exhibited before the January, 1896, meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia.

large irregular scotomatous area to the nasal side, the visual field for form was normal in size and in shape.

A few drops of a four-grain solution of sulphate of atropine were instilled into the conjunctival sac and a pressure bandage was applied. The patient was then sent to Dr. George Strawbridge, the Ophthalmic Surgeon of the hospital, who concurred in the writer's opinion that an immediate attempt for removal of the supposed foreign body in the vitreous should be made with an electro-magnet.

Next day, the patient was admitted to the surgical wards of the Presbyterian Hospital, and the field of operation was carefully prepared by freely washing the face and scalp with a 1/2000 solution of bichloride of mercury, and the conjunctival sac was freely douched with sterile water. The instruments were boiled and were kept immersed in a bath of alcohol. The patient was etherized, and at 3:30 P.M., just forty-eight hours after the accident, the writer, with the aid of one of his assistants, Dr. James Thorington, made a free meridional incision of about one-half a centimeter's length through the conjunctiva and lower outer quadrant of the sclerotic between the insertions of the external rectus and inferior rectus muscles. Through this opening, a narrow straight electrode carrying a current of thirty-five cells strength was introduced, and after a few carefully performed movements in the direction of the position of the supposed substance, a sudden impact was felt, which upon withdrawing the instrument through the outspread opening, proved to be caused by a piece of steel about a millimeter and a half in diameter; the adherent foreign body was thus extracted. The conjunctival sac was cleansed. Atropine was instilled and the eye was carefully bandaged. The patient was placed in bed.

Upon the following day, the scleral wound was firmly united. In six days' time, the eye was quiet, and four days later, the man was discharged from the house as an outpatient. A soothing wash of a saturated solution of boracic acid and two drops of a four-grain solution of sulphate of atropine were ordered to be used bi-daily.

On the twenty-sixth of the month, uncorrected vision equalled one-fourth ( $\frac{5}{xx}$ ) and the patient could read the one diopter type from ten to forty-eight centimeters.

Five days later, it was noticed that the localized lenticular



opacities to the outer side had become slightly more dense, and seemed to encroach further into the pupillary area. The eye-ground could be plainly seen through the nasal half of the lens, showing a vertically oval disc of seven by eight diameters in apparent size, surrounded by a scleral ring with a line of blackish pigment situated beyond to the outer side. The disc substance appeared reddish-gray in tint, probably on account of being seen through some fine vitreous opacities. The last noting in the hospital records, three weeks later, states that the lenticular opacities had not increased and that the vision remained the same as at the previous visit.

Although many attempts were afterward made to find and restudy the case, yet it was not until one month ago, nearly five years after the accident, that a private case called at the writer's office with the assertion that the patient had recommended him for treatment. The patient was sent for and the ocular conditions were restudied.

At present, except upon prolonged exposure to strong illumination, the eye is perfectly white and quiet. Both the corneal and iris scars can be plainly seen. The lens is cataractous. The iris is freely mobile to light-stimulus thrown from various parts of the visual field. Light-perception is good in all parts of the field of vision. Intraocular tension is normal. The position and extent of the scleral cicatrix can not be recognized except by the strongest and most concentrated illumination. In other words, there is a practically quiet eye, from which, should ever occasion demand or the patient so desire, its opaque lens can be removed and useful vision re-established.

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TESTIMONIAL TO JOHN S. BILLINGS, M.D., LL.D. — The American contributors to the Billings' Testimonial met at the Hotel Bellevue, Philadelphia, November 30, 1895. Addresses were made by Drs. S. Weir Mitchell, J. M. Da Costa, J. R. Chadwick, Robert Fletcher, A. Jacobi and William Osler. The testimonial consisted of a silver box which contained a check for \$10,000, and which had engraved upon it, "To John S. Billings, from 259 physicians of the United States and Great Britain, in grateful recognition of his services to Medical Scholars."

## CLINICAL MEMORANDA.

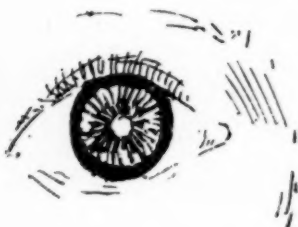
### AN UNUSUAL CASE OF CATARACT.

By FRANK ALLPORT, M.D.,

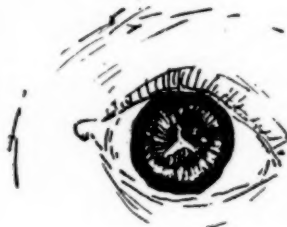
OF MINNEAPOLIS, WIS.

Professor of Clinical Ophthalmology and Otology in the Minnesota State University; President of the Minnesota State Medical Society, Etc.

Mrs. R. N. M., aged 51. Both eyes. In fair health. Complains of dimness of vision. Has never worn glasses. Up to 25 years of age had perfect eyes; at that time suffered severely from what was apparently a case of acute purulent conjunctivitis, followed by very weak eyes for about a year, at which time she noticed a decided and gradually continuing depart-



RIGHT.



LEFT.

The white markings in the pupillary spaces represent the lenticular opacities.

ure from her usual excellent vision. When about thirty years of age, she consulted Drs. Liedold and Knapp, of New York City, and Dr. Rider, of Rochester, N. Y., who all concurred in the diagnosis of hard cataracts and commented upon the fact of their occurrence at such an early period of life. She was advised to do nothing for her eyes, and consulted no one until the present time, November 14, 1895, when I was consulted. She declared her distant vision to be as good as ever, but complains of inability to use her eyes at close work, which, until recently, she has performed without difficulty, and which appears to be merely the evidence of advancing presbyopia.

I find her vision to be: Right eye  $\frac{20}{60}$ , Left eye  $\frac{5}{60}$   
Under homatropine. Right eye  $\frac{20}{60}$ —2.75 cyl. ax.  $180^\circ$  produces  $V.=\frac{20}{100}$ . Left eye  $\frac{5}{60}$ , unimproved by glasses.

The best glass for near work proves to be +0.75 spher., which renders satisfactory service in the right eye, the left eye not participating in the work.

I have endeavored to reproduce the appearance of the two lenses in the accompanying drawings, and therefore feel it unnecessary to make additional comment, except to say that the opacities are principally in the anterior portion the lenses, and largely capsular.

As she is quite comfortable under her present circumstances and has become accustomed to her condition, I have advised her to leave her eyes alone, feeling it to be quite probable that she will never become any worse.

She was seen at my request, by Drs. Morton and Pineo, of this city. The case appears to be unique, because she is a woman of veracity and unusual intelligence, possesses two non-progressive, well authenticated cataracts of twenty-one years standing, and if we may add the four years occurring between the time of commencing visual impairment and her consultation with the three gentlemen mentioned—which I think may be safely done—the time may be extended to twenty-five years.

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#### A CASE OF PROBABLE SPONTANEOUS ABSORPTION OF PART OF A CATARACTOUS LENS. DISLOCATION OF THE SMALL NUCLEUS INTO THE ANTERIOR CHAMBER. GLAUCOMA.

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BY ADOLF ALT, M.D.,

OF ST. LOUIS, MO.

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J. H., 66 years old, had a ripe senile cataract extracted by me from his right eye, thirteen years ago. Healing was perfect and he is still enjoying good vision in this eye.

A week ago he came to consult me on account of his left

eye. When I had seen him last, ten years ago, this eye presented a semi-ripe cataract without any complication. Six years ago, he states, this eye was as blind as the right one had been before the extraction.

Two years ago, without any known cause, the blind eye became severely inflamed, but under treatment the inflammation subsided. Such attacks of inflammation with severe pain have come on, to his knowledge, five times, the last one having started five weeks before his return to me and having remained unabated since, in spite of eserine instillations ordered by his physician. To this statement of the patient his daughter added, that the grey spot which had for years covered the pupil "had fallen down" since the last attack of inflammation.

When I saw him, the patient was evidently worn out with pain. The lids were œdematous, the eyeball greatly injected, the pupil contracted *ad maximum*, and the tension, in spite of this, considerably increased. In the lower iris-angle, trembling, as did the iris, with every movement, lay a round amber-grey substance. Vision was reduced to perception of light, an ophthalmoscopic examination was impossible on account of the smallness of the pupil and the pain produced by the attempt. After several instillations of cocaine I made an attempt to extract the foreign substance, which I am convinced is the nucleus of the lens; but as soon as I grasped the conjunctiva a subconjunctival hæmorrhage occurred which increased rapidly to an alarming extent and gave the patient an enormous amount of pain. All I succeeded in doing was to make a scleral incision passing with the knife through the lens nucleus. Further steps the patient refused absolutely. Reluctantly I closed the eye up. He has since been free from pain.

Whether a dislocation of the lens occurred at first or whether the lens was dislocated by a glaucomatous attack, I do not know. I presume, however, that a partial absorption of the lens substance had taken place and that the capsule was ruptured during the last glaucomatous attack allowing the nucleus to fall into the anterior chamber.

## OPHTHALMIC DIGEST.

By J. ELLIS JENNINGS, M.D.,  
OF ST. LOUIS, MO.

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### OBSERVATIONS REGARDING EYESTRAIN AND ITS RELIEF.

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EDWARD JACKSON, M.D., of Philadelphia, (*Medical News*, October 5, 1895):

There is a common impression that eyestrain is simply and solely a result of ocular defects—that without some ocular fault there is no eyestrain; and that the discovery of some marked anomaly of refraction, or of the ocular muscles, is the one thing needful to establish the diagnosis of eyestrain; and the correction of that error of refraction or fault of muscular balance is the sole and sufficient treatment of the condition. There are too many physicians who, suspecting a connection between the eyes and a chronic headache, come to the ophthalmologist and ask if the patient has any error of refraction, expecting the answer to settle all questions of pathology, and a pair of glasses to sum up the treatment.

Now, as a matter of fact, ametropia of any degree may be altogether unattended with eyestrain, and eyestrain can exist without any ocular defect. Of course, in a great many cases the two are intimately associated. Ametropia is perhaps the most effective and most common predisposing cause of eyestrain; and the mass of cases of eyestrain present ametropia sufficient in amount to be practically important. Nevertheless, ametropia and eyestrain are distinct conditions. One sees every grade of the various forms of ametropia in persons who use their eyes without eyestrain, and typical severe eyestrain although the eyes may be free from defect.

The various factors of eyestrain may be summarized thus:

*First.* Ocular defects, including ametropia, insufficient power of accommodation and (rarely) faults of muscle-balance.

*Second.* Improper requirements in the way of eyework, including excessive hours of eyework, excessive minuteness of



objects looked at, inferior illumination, imperfect adjustment of optic instruments, wrong position of the object, or wrong arrangement of hours of eyework and recreation.

*Third.* Defects of general nutrition, including chronic ill-health, the immediate and after-effects of acute specific disease, and diathetic influences.

*Fourth.* Imperfect organization of the nervous system or degenerative changes in it, including the influence of sudden changes in the amount or kind of eyework, and certain forms of senile decay.

These four classes include a host of individual causes which are to be borne in mind, and their relative importance carefully estimated in the study of a given case. Any narrower routine will at times result in unnecessary failure; but the narrower way of regarding the case is far too common. One needs constantly to remember that an ocular headache is not aggravated only by overwork; it may be aggravated, or even set up, by the recurrence of the menstrual epoch, by hunger, by anemia, by exhaustion of mind or body, or by the lowered character of the general nutrition after exhausting illness. And, conversely, it is not benefitted merely by lenses or prisms, atropin, or the dark-room; but by sleep, food, tonics, and all wholesome influences. On the other hand, it is an error equally serious to assume, because a headache is benefitted by a hearty meal, or a brisk purge, or rest from business, or a course of iron and strychnin, that eyestrain can have nothing to do with it. And the same is true of the other symptoms that we group under this general head of eyestrain.

To even a greater extent do these factors, other than the mere optic defect, influence the prognosis and the treatment. Age, especially as indicating the evolution or involution, present or prospective, of the nervous system, the tendency of the nervous system as regards habitual or recurrent pain; the state and prospects of general nutrition; the necessary requirements of occupation on the whole organism, as well as on the eye, must be considered before an intelligent prognosis can be given. And while the removal of the single causative factor will relieve some patients, the proportion of those relieved will rise with the skilful combating of every adverse and depressing influence. Glasses may be of value or essential, but so may be readjustment of eyework, improved general nutrition, or the

recognition of those bounds that the constitution of the patient sets on habitual effort.

The next point to which I would ask attention is that the intensity of the eyestrain is not directly proportional to the ocular fault that gives rise to it. The former may even seem inversely proportional to the latter. An ocular defect may give rise either to imperfect vision or to eyestrain, less generally to both. It is the higher degrees of ametropia that necessarily cause imperfect vision, while the lower, in which imperfect vision can be obviated by increased exertion, more commonly cause eyestrain. Then the prognosis as to the continuance of the symptoms complained of is the more unfavorable in proportion to the smallness of the ocular defect sharing in their causation. The factor of ametropia entering into the causation is the only factor that can be always and with certainty removed. In proportion as it is relatively small the share of the other factors less amenable to the measures at our command becomes relatively large, and our ability to give relief correspondingly doubtful.

Particularly after middle life do small errors of refraction or imperfections of adjustment cause severe and persistent strain. When the power of accommodation has so diminished that the correction of 1 D. of hyperopia is quite beyond its range, 0.25 D. of the same error of refraction may prove a constant provocation to painful effort on the part of the ciliary muscle, or an equal amount of inaccuracy in the adjustment of lenses may be equally injurious.

Another point worthy of attention is the complete difference in the effects produced by a perfectly accurate correction of ametropia, as compared with those due to a slightly inaccurate correction. The difference in relief given is often utterly out of proportion to the difference in the refracting power or axial direction of the lenses, but clinically the fact is well established. Perhaps it will help us to understand it to remember that if an emmetrope attempts to work with a pair of 0.5 D. concave lenses, the annoyance experienced is far greater than that usually felt by the hyperope with an error of 1.5 D. The ametropia proves most disastrous to the person not accustomed to it, and if one wears the wrong glasses the fault of focus that he has to contend with is always one to which he is not accustomed. If the inaccuracy be simply in the direction of a lower

degree of the original fault, this may not be noticed if the ratio between the two eyes be properly preserved. Yet even then the result can not be regarded as wholly satisfactory.

Finally, as regards relief of eyestrain through the wearing of glasses, let me call attention to the practical importance of the *period of adaptation* to the use of glasses. In nearly all works on the subject this period of adaptation is slighted or ignored. It is commonly stated that the wearing by young persons of convex lenses correcting their total hyperopia will at first cause blurring of distant vision, and sometimes it is mentioned that strong concave lenses may at first prove unsatisfactory for near work; but no adequate expression is given of the fact that nearly every pair of glasses adjusted, if they be adequate to the needs of the case, and of more than trifling strength, will at first cause discomfort and aggravation of some symptoms of eyestrain, or at least markedly less comfort than they will give when the eyes have become accustomed to working through them. It is a matter of the first practical importance that this period should be borne in mind and the patient fully warned of its existence and characteristics.

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THE RETIREMENT OF DR. GEO. M. GOULD from the editorship of the *Medical News* is a great loss to medical journalism in America. His sound judgment, impartial criticism, honesty of purpose and scholarly attainments have won for him a reputation which has been well earned and is well deserved. In company with his host of friends, we tender to him our best wishes for his future successes.—*Medical Record*.

FOUR CASES OF GLIOMA OF THE RETINA IN ONE FAMILY.—Feinstein describes the following cases: Twenty years ago a boy 2 years old was operated on for a neoplasm in the eye, and some months afterward fatal relaps occurred. Two years later enucleation of an eye was performed on his sister for the same kind of growth, the patient being still living. A second sister, 7 years of age, was operated on four years ago, but died three months after from relapse of the growth. Last year a brother of these patients brought his 4-year-old daughter for examination, when it was found that she also suffered from glioma, enucleation being necessary.—*Gazeta lekarska*.

## MISCELLANY.

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### ON THE NEW KIND OF RADIATION.

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By ARTHUR SCHUSTER, Ph.D., F.R.S.,

Langworthy Professor of Physics and Director of the Physical Laboratory, the  
Owens College, Manchester, Eng.

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Professor Röntgen, of Würzburg, announces the discovery of remarkable photographic effects which he ascribes to a new kind of radiation. As the statements which have appeared in most of the daily papers are inaccurate in many respects, a short description of what Professor Roentgen claims to have accomplished may interest the readers of the *British Medical Journal*. The photographs which the professor has kindly sent me fully bear out his statements, and there can be no doubt that a most important discovery has been made.

It has long been known that the highly-electrified particles which are projected from the negative pole of a vacuum tube produce a strong luminosity (phosphorescence) when they strike against the glass walls of the tube. Professor Roentgen's discovery is that, in addition to this phosphorescence, another radiation is produced which is capable of penetrating through all bodies, though not to the same extent—thus, aluminium is more transparent to this radiation than Iceland spar. The radiation passes in straight lines easily through paper, cardboard, or wood, and produces photographic effects after having passed through two complete packs of cards.

Professor Roentgen shows a photograph which has been taken in one room, the tube producing the radiation being in another room, the rays having passed through the door. One of the photographs in my possession shows a complete image of a compass needle, with the divisions into degrees of the circle over which the needle is placed. The compass needle, before being photographed, was placed inside a metal box. As flesh, skin and cartilage are more transparent than bone, the photograph of a hand gives a complete outline of the bones of the hand and fingers, the outline of the flesh being only



very faintly marked. It is not necessary to enter into the many possible medical applications which this photograph opens out.

One characteristic feature of this new radiation, which distinguishes it from all effects so far known of radiant light and heat, is that it can not be refracted or reflected; that is to say, it will pass through a prism of aluminium having an angle of 60 degrees without being deviated from its original course. Hence lenses will not focus the rays, which will pass through a lens as they pass through an ordinary glass window. The photographs obtained are, therefore, of the nature of shadows, and their great sharpness is itself a testimony that the new radiation must be propagated in straight lines. The radiation produces fluorescence as well as photographic effects. Professor Roentgen does not give any information as to the length of exposure required, but any photographic plate or film seems to act. The photographs may be taken in ordinary daylight if the plate is kept in its dark slide, which will completely cut off all ordinary light rays and yet transmit the new radiation. It is, of course, at present impossible to say what this new radiation will turn out. Professor Roentgen throws out the suggestion that it may consist of longitudinal vibrations in the ether. One's first impulse is to ascribe it to vibrations of extremely minute length. But, in any case, the fact that the velocity of its propagation is the same in vacuo, glass and aluminum will be a puzzle to mathematical physicists.

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#### PHOTOGRAPHY OF RETINAL IMPRESSIONS.

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An article of much interest, by Mr. W. Inglis Rogers, appeared in the *Amateur Photographer* of November 22, 1895, under the startling heading of "Psychography or Photography Without a Camera. The Dawn of a New Science." In this article the following experiments are related: A small object, in one case a shilling, in the other a postage stamp, was placed in a good light before the writer, who gazed fixedly at it for one minute; the light was then shut off, and the test object re-



placed by a rapid photographic plate, at which the author looked steadily for a period (in the second experiment) of twenty minutes, concentrating his thoughts meanwhile wholly upon the image of the object he had been previously fixing. During the substitution of the plate for the last object, the observer's eyes were closed. The plate was then developed in the ordinary way, and reproductions of the psychograms are given the journal. In the first case, in which a shilling was the test object, the print shows an ill-defined circle on the plate, and in the second, when a postage stamp was employed (and a larger plate used than before) "two impressions were obtained, one from each eye, and at respectively the same distance from each other as the eyes." These impressions (in the reproduction) bear a distinct resemblance to a postage stamp; more than this we can not at present admit. These experiments, or similar experiments, can be carried out by anyone with a little assistance. The subject is one which merits most careful and thorough investigation, and by such research alone can we determine whether or no Mr. Roger's sanguine expectations in regard to his discovery are likely to be obtained.

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RAMPOLDI'S SIGN.—Rampoldi claims that a transitory but recurrent (and unequal) dilatation of the pupils is an early and almost constant sign of the ordinary form of pulmonary phthisis, and that this pupillary anomaly results from an irritation transmitted by way of the sympathetic to the nerves supplying the iris.—*Medicine*.

YELLOW OXIDE of MERCURY OINTMENT.—Dr. S. Holth, of Norway, finds that decomposition of the ointment of yellow oxide, showing itself in grayish discoloration is dependent entirely upon the reducing effect of light passing through the more or less transparent walls of the ointment-pots in ordinary use. He therefore advises the use of absolutely opaque pots provided with similar covers.—*Arch. of Ophth.*

## OBITUARY.

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JAMES DIXON, F.R.C.S., ENG.

We regret to have to announce the death of Mr. James Dixon, who died at his residence, Harrow Lands, Dorking, on January 2, aged 82. He was one of the most accomplished and respected surgeons of his day. He was the contemporary of Bowman and White Cooper, and held a high position alongside of them. His high-bred manner and courteous personal bearing belonged to the best school of an earlier professional generation. Little seen and seldom heard in public, his opinion was valued and the weight of his personal influence was felt to an extent far beyond his public utterances.

He was at one time Assistant Surgeon to St. Thomas' Hospital, and was for many years Consulting Surgeon to the Royal London Ophthalmic Hospital. He was author of a "Guide to the Practical Study of Diseases of the Eye," which went to a third edition, and while resident at first in Green Street and afterwards in Portman Square he enjoyed a very large practice as an ophthalmic surgeon. In 1870, in consequence of the illness and subsequent death of his wife, he left London and gave up the active exercise of his profession. The last twenty-five years of his life were passed in retirement at Dorking, where he was ever ready with skilled advice and kindly help in cases of ophthalmic trouble among his poorer neighbors. Much of his leisure was devoted to the study of the English language, and he had a special acquaintance with English literature and history of the eighteenth century and of the earlier part of the present century. He qualified as M.R.C.S., Eng. in 1836, becoming a Fellow of the College in 1843.

His contributions to medical literature were unfortunately rare. He was an occasional contributor and constant friend and frequent correspondent, publicly and privately, of the *British Medical Journal*, and although the opportunities of such communications have been now for some years comparatively rare, he was a constant reader of the *Journal*, and from

time to time favored us with pleasant and interesting communications on literary and professional questions, in which we were always glad to be favored with his views and reminiscences. His loss will be felt by many old and early friends, although his contemporaries and associates have for the most part long passed away.—*British Medical Journal*.

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#### EDITORIAL NOTE.

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It is with great pleasure that we acknowledge the receipt of a considerable number of letters of congratulation on our assuming the whole management of this Journal and the appearance of the first number under the new rule. We trust that the subscription list, which has increased very markedly since January, will keep rising, so that we will be still better able to place the Journal in the shape we desire. It will be a greater source of gratification, yet, if the gentlemen engaged in ophthalmic literary work, will favor us with contributions.

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#### BOOKS AND PAMPHLETS.

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REPORT OF THE HOSPITAL FOR EYE-DISEASES, UTRECHT. 1895. (HET JAARVERSLAG VAN HET NEDERLANDSCH GASTHUIS VOOR OOGLIJDERS). No. 36.

Like its predecessors, this annual report of the Utrecht (Holland) Eye-Hospital contains a number of very interesting articles by its able surgeons. Part of them are, however, not new to us, as they have appeared previously in *Graefe's Archives*. A great deal of interesting matter is contained in the minutes of the Netherlandish Ophthalmological Society.

ALT.

"Blakiston & Son's, Philadelphia, Visiting List for 1896."

"Degenerative Heredity." By Ch. Denison, A.M., M.D.

"Physicians' Record-Book." By Flavel B. Tiffany, M.D.

"Clinical Notes of Cataract Patients." By D. Coggin, M.D.

"A New Operation for Congenital Ptosis." By T. C. Evans, M.D.

"Description for an Improved Trial-Frame." By Ch. A. Oliver, M.D.

"Astigmatism of Twenty-Eight Dioptrics." By Ch. W. Dodd, M.D.

"Familiar Types of Insanity. Their Diagnosis." By J. Punton, M.D.

"Annual Report of the New York Ophthalmic and Aural Institute for 1895."

"Baltimore Presbyterian Eye, Ear and Throat Charity Hospital Report," No. 1.

"The Color-Sense and Color-Blindness, With Practical Tests for Color-Blindness." By W. H. Snyder, M.D.